



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/590,039	08/02/2007	Markku Renfors	915-007.208	5506

4955 7590 06/17/2010
WARE FRESSOLA VAN DER SLUYS & ADOLPHSON, LLP
BRADFORD GREEN, BUILDING 5
755 MAIN STREET, P O BOX 224
MONROE, CT 06468

EXAMINER

NGUYEN, LEON VIET Q

ART UNIT

PAPER NUMBER

2611

MAIL DATE

DELIVERY MODE

06/17/2010

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/590,039

Applicant(s)

RENFOR ET AL.

Examiner

LEON-VIET Q. NGUYEN

Art Unit

2611

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 June 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4, 10-18, 24-32 and 38-43 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 3, 10-15, 17, 24-29, 31 and 38-43 is/are rejected.
- 7) ☒ Claim(s) 2, 4, 16, 18, 30 and 32 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 January 2010 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-940)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

1. This office action is in response to communication filed on 6/4/10. Claims 1-4, 10-18, 24-32, and 38-43 are pending on this application.

Response to Arguments

2. Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.

Response to Remarks

Regarding claim 1, applicant asserts that Howard does not disclose setting a complex coefficient as a phase rotator part of an equalizer (Remarks page 11 first paragraph).

Examiner agrees. However Howard teaches performing phase correction for the phase response of the filter (§0048). The phase correction would require rotation of the phase of the signal.

Also regarding claim 1, applicant asserts that Howard does not disclose setting a coefficient of a real filter part of an equalizer (Remarks page 11 second paragraph).

Examiner respectfully disagrees.

In fig. 1 of Howard, the examiner interprets sections 110 and 120 to comprise and equalizing section. RRC filters 112 and 114, which are part of section 110, have real filter coefficients and are therefore considered real filter parts (§0039).

Further regarding claim 1, applicant asserts that the filters as taught by Howard are not allpass filters (Remarks page 11 third paragraph).

Examiner agrees. However the argument is moot in view of the new grounds of rejection.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. **Claims 1, 3, 11, 15, 17, 25, 29, 31, 39 and 43 are rejected under 35**

U.S.C. 103(a) as being unpatentable over Tapia et al (US5555285) in view of Howard (US20060209881) and Hammes et al (US20030215028).

Re claim 1, Tapia teaches a method for use in an equalization of a channel by means of an equalizer, wherein said channel uses a certain frequency band for a transfer of signals (col. 23 lines 35-43), said method comprising:

determining a channel response for at least three frequency points within said frequency band used by said channel (col. 23 lines 44-59, col. 24 lines 31-39, col. 25 lines 45-55, the P frequency points must be greater than one and it would be obvious to set P to be three or more); and

setting adjustable coefficients of said equalizer (col. 23 lines 35-43, col. 24 lines 13-20) such that an equalizer response compensates the determined channel response at said at least three frequency points (col. 24 lines 28-30).

Tapia fails to teach wherein setting said of adjustable coefficients comprises for an equalization of phase of said channel setting a complex coefficient as a phase rotator part of said equalizer, setting at least one coefficient of a non-real complex all-pass filter part of said equalizers, and setting at least one coefficient of a real all-pass filter part of said equalizer.

However Howard teaches wherein setting adjustable coefficients comprises for an equalization of phase of said channel setting a complex coefficient as a phase rotator part of said equalizer (§0048, the phase equalization and correction of the phase response would require rotation), setting at least one coefficient of a non-real complex filter part of said equalizers (§0039, filters 122 and 124 in fig. 1. It would be necessary to set the complex filter coefficients. Furthermore, since the filter is complex rather than real, it is interpreted to be a non-real filter) and setting at least one coefficient of a real filter part of said equalizer (§0039, filters 112 and 114 in fig. 1. It would be necessary to set the real filter coefficients).

Therefore taking the combined teachings of Tapia and Howard as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the steps of Howard into the method of Tapia. The motivation to combine Howard and Tapia would be to minimize complexity (§0068 of Howard).

Tapia also fails to teach wherein the filters of the equalizer are all-pass filters. However Hammes teaches an equalizer using all-pass filters (§0033).

Therefore taking the combined teachings of Tapia and Hammes as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the steps of Hammes into the method of Tapia. The motivation to combine Hammes and Tapia would be to compensate for group delay distortion (§0033 of Hammes).

Re claim 3, the modified invention of Tapia teaches a method further comprising selecting a number of said at least three frequency points for said channel (col. 25 lines 55-60 of Tapia, P measured points of a frequency spectrum. It would be obvious to set P to be three) to correspond to a minimum number which can be expected to result in a sufficient channel equalization (col. 23 lines 35-37 of Tapia).

Re claim 11, the modified invention of Tapia teaches use of the method for a single channel of a single carrier system (col. 11 lines 15-23 of Tapia).

Re claim 15, the claimed limitations recited have been analyzed and rejected with respect to claim 1. It would be necessary to have an apparatus implemented in hardware to perform the method as claimed in claim 1.

Re claim 17, the claimed limitations recited have been analyzed and rejected with respect to claim 3.

Re claim 25, the claimed limitations recited have been analyzed and rejected with respect to claim 11.

Re claim 29, the claimed limitations recited have been analyzed and rejected with respect to claim 1.

Re claim 31, the claimed limitations recited have been analyzed and rejected with respect to claim 3.

Re claim 39, the claimed limitations recited have been analyzed and rejected with respect to claim 11.

Re claim 43, the claimed limitations recited have been analyzed and rejected with respect to claim 1.

3. Claims 10, 24, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tapia et al (US5555285), Howard (US20060209881) and Hammes et al (US20030215028) in view of Vanderhelm et al (US20030224751).

Re claim 10, the modified invention of Tapia fails to teach setting said adjustable coefficients comprises for an equalization of amplitude of said channel setting at least one coefficient of a symmetric 5-tap Finite Impulse Response filter part of said equalizer.

However Vanderhelm teaches setting said at least one adjustable coefficients comprises for an equalization of amplitude of said channel setting at least one coefficient of a symmetric 5-tap Finite Impulse Response filter part of said equalizer (¶0072).

Therefore taking the combined teachings of Tapia, Hammes and Howard with Vanderhelm as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the steps of Vanderhelm into the

method of Tapia, Hammes and Howard. The motivation to combine Vanderhelm, Hammes, Howard and Tapia would be to remove noise (¶0072 of Vanderhelm).

Re claim 24, the claimed limitations recited have been analyzed and rejected with respect to claim 10.

Re claim 38, the claimed limitations recited have been analyzed and rejected with respect to claim 10.

4. Claims 12, 13, 26, 27, 40 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tapia et al (US5555285), Howard (US20060209881) and Hammes et al (US20030215028) in view of Alhava ("Time-Domain Equalizer for Filter Bank-Based Multicarrier Communications", 2002 IEEE, pages 184-188).

Re claim 12, the modified invention of Tapia fails to teach use of the method for each of a plurality of sub-channels of a filter bank based multicarrier system or of a transform based multicarrier system.

However Alhava teaches using an equalization method for each of a plurality of sub-channels (page 184 left side fifth paragraph, OFDM is well known to have multiple sub-channels) of a filter bank based multicarrier system (page 184 right side third paragraph) or of a transform based multicarrier system.

Therefore taking the combined teachings of Tapia, Hammes and Howard with Alhava as a whole, it would have been obvious to one of ordinary skill in the art at the

time the invention was made to incorporate the steps of Alhava into the method of Tapia, Hammes and Howard. The motivation to combine Alhava, Hammes, Howard and Tapia would be to provide resistance against narrowband interference (Abstract of Alhava).

Re claim 13, the modified invention of Tapia fails to teach use of the method for each of a plurality of sub-channels of a filter bank based multiantenna system or of a transform based multiantenna system in a Multiple Input Multiple Output configuration.

However Alhava teaches using an equalization method for each of a plurality of sub-channels (page 184 left side fifth paragraph, OFDM is well known to have multiple sub-channels) of a filter bank based multiantenna system or of a transform based multiantenna system in a Multiple Input Multiple Output configuration (page 184 right side fourth paragraph).

Therefore taking the combined teachings of Tapia, Hammes and Howard with Alhava as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the steps of Alhava into the method of Tapia, Hammes and Howard. The motivation to combine Alhava, Hammes, Howard and Tapia would be to provide resistance against narrowband interference (Abstract of Alhava).

Re claim 26, the claimed limitations recited have been analyzed and rejected with respect to claim 12.

Re claim 27, the claimed limitations recited have been analyzed and rejected with respect to claim 13.

Re claim 40, the claimed limitations recited have been analyzed and rejected with respect to claim 12.

Re claim 41, the claimed limitations recited have been analyzed and rejected with respect to claim 13.

5. Claims 14, 28, and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tapia et al (US5555285), Howard (US20060209881) and Hammes et al (US20030215028) in view of Kabel et al (US20040042557).

Re claim 14, the modified invention of Tapia fails to teach use of the method for channels which are to be processed in an analysis-synthesis filter bank configuration.

However Kabel teaches using an equalization method for channels which are to be processed in an analysis-synthesis filter bank configuration (§0032).

Therefore taking the combined teachings of Tapia, Hammes and Howard with Kabel as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the steps of Kabel into the method of Tapia, Hammes and Howard. The motivation to combine Kabel, Hammes, Howard and Tapia would be to allow high performance signal detection (§0032 of Kabel).

Re claim 28, the claimed limitations recited have been analyzed and rejected with respect to claim 14.

Re claim 42, the claimed limitations recited have been analyzed and rejected with respect to claim 14.

Allowable Subject Matter

6. Claims 2, 4, 16, 18, 30 and 32 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LEON-VIET Q. NGUYEN whose telephone number is (571)270-1185. The examiner can normally be reached on Monday-Friday, alternate Friday off, 7:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Payne can be reached on 571-272-3024. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Leon-Viet Q Nguyen/
Examiner, Art Unit 2611

/David C. Payne/
Supervisory Patent Examiner, Art Unit 2611